

IN THE CLAIMS:

1. (Currently Amended) A breathing assistance apparatus adapted to deliver humidified gas at a desired level of humidity or at a desired temperature within a conduit to a patient using open loop control comprising:

a humidifier ~~having an electrical input power and~~ capable of humidifying said gas up to a level of humidity prior to delivery to said patient, the humidifier having an electrical input power, said level of humidity depending on said input power to said humidifier,

a conduit configured to convey said humidified gas from said humidifier to a patient,

a conduit heater ~~having an electrical input power, and being associated with said~~ conduit wherein the gas flowing through said conduit ~~are~~ is heated either directly or indirectly by said conduit heater, the conduit heater having an electrical input power, whereby the level of heating depending on said input power to said conduit heater,

a conduit heater power monitor providing an output indicative of the input power to said conduit heater, and

a controller or processor configured or programmed to carry out the following instructions:

(a) monitor said input power supplied to said conduit heater and to determine a parameter which in combination with said input power is indicative of ~~the resistance or temperature of said conduit heater or the flow rate of gas~~ through said conduit based upon ~~said input power~~;

(b) determine based on ~~at least~~ said parameter the required electrical power input to said humidifier to deliver said gas to said patient at a level of humidity or at a temperature substantially similar to said desired level of humidity or said desired temperature;

(c) supply as said input power to said humidifier a level of power substantially similar to said determined power input to said humidifier;

(d) continuously monitor said parameter, and when a change in said parameter is greater than a first threshold, ~~said controller or processor~~ reverts to said instruction (a).

2. (Currently Amended) A breathing assistance apparatus as claimed in claim 1, wherein at instruction (d) further comprising the steps of continuously monitoring said parameter, and when a change in said parameter is greater than a first threshold, said controller or processor reverts to said instruction (a); when a change in said parameter is greater than a second threshold, said controller or processor reverts to instruction (b), said second threshold relating to a lesser change in the flow rate than said first threshold.

3. (Previously Presented) A breathing assistance apparatus as claimed in claims 1 or 2 wherein said breathing assistance apparatus further comprises:

an ambient temperature sensor providing an indication of the exterior temperature or said controller or processor storing an assumption of the exterior temperature used as an indication of the exterior temperature; and said instruction (b) further comprises determining based on at least said indication of the exterior temperature the required power input to said conduit heater to deliver said gas to said patient at a level of humidity or at a temperature substantially similar to said desired level of humidity or said desired temperature; and

said instruction (c) further comprises supplying as said input power to said conduit heater a level of power substantially similar to said determined power input to said conduit heater.

4. (Previously Presented) A breathing assistance apparatus as claimed in claim 3 wherein said first threshold relates to the rate of change of said parameter with respect to time, wherein when said rate of change is greater than said first threshold said controller or processor reverts to said instruction (a).
5. (Previously Presented) A breathing assistance apparatus as claimed in claim 4 wherein said rate of change or said change in said parameter indicates a decrease in flow said controller or processor pauses for a first delay before said controller or processor reverts to said instruction (a) and if said rate of change or said change indicates an increase in flow said controller or processor pauses for a second delay before said controller or processor reverts to said instruction (a), said second delay being longer than said first delay.
6. (Currently Amended) A breathing assistance apparatus as claimed in claim 1, configured to estimate the temperature of said conduit heater based on the said-determined resistance of said conduit heater and at least one characteristic of said conduit heater.
7. (Currently Amended) A breathing assistance apparatus as claimed in claim 6, wherein ~~said indication of the temperature~~ of the conduit heater or resistance is used by said controller or processor at least in said instruction (d) as said parameter relating to the flow rate of said gas.

Claims 8-18 (Cancelled)

19. (Currently Amended) A method of delivering humidified gas at a desired level of humidity or at a desired temperature to a patient using an open loop controlled humidifier comprising the steps of:

- (a) ~~monitor the~~ monitoring power input to ~~said a~~ conduit heater;
- (b) determining a parameter which in combination with said power input is indicative of the ~~relating to the resistance or temperature of said conduit heater or the flow rate of said gas through said~~ conduit heater humidifier from said power input;
- (c) determining based on at least said parameter the required electrical power to said humidifier to deliver said gas to said patient at a level of humidity or at a temperature substantially similar to said desired level of humidity or said desired temperature;
- (d) supplying a level of power to said humidifier substantially similar to said determined power;
- (e) continuously monitoring said parameter, and when a change in said parameter is greater than a first threshold, indicating a change in the flow rate of said gas, revert to step (a).

20. (Currently Amended) A method as claimed in claim 19 wherein at step (e) further comprising: when a change in said parameter is greater than a second threshold indicating said controller or processor reverts to step (c), said second threshold relating to a lesser change in the flow rate than said first threshold.

21. (Currently Amended) A method as claimed in claims 19 or 20 further comprising the steps of:

conveying said humidified gas to a patient via a conduit;

heating the conveyed gas either directly or indirectly using the a conduit heater;
sensing or making an assumption of the exterior temperature;
at and said step (c) ~~further comprises~~ determining based on at least said indication of the exterior temperature the required power input to said conduit heater to deliver said gas to said patient at a level of humidity or at a temperature substantially similar to said desired level of humidity or said desired temperature;
and at said step (d) ~~further comprises~~ supplying as said input power to said conduit heater a level of power substantially similar to said determined power input to said conduit heater.

22. (Currently Amended) A method as claimed in claim 21 wherein said first threshold relates to the rate of change of said parameter with respect to time, ~~wherein when said rate of change is greater than said first threshold said controller or processor reverts to said step (b).~~

23. (Previously Presented) A method as claimed in claim 22 wherein said rate of change or said change in said parameter indicates a decrease in flow said controller or processor pauses for a first delay before said controller or processor reverts to step (b) and if said rate of change or said change indicates an increase in flow said controller or processor pauses for a second delay before said controller or processor reverts to step (b), said second delay being longer than said first delay.

24. (Cancelled)

25. (Currently Amended) A method as claimed in claim ~~24~~ 19 wherein said indication of the temperature or resistance of the conduit heater is used at least in step (e) as said parameter relating to the flow rate of said gas.

26. (Cancelled)

27. (Cancelled)

28. (Previously Presented) A method as claimed in claim 21 wherein the determination of said power to said humidifier in said step (c) is also based on said indication of the external temperature.

29. (Previously Presented) A method as claimed in claim 19 further comprising the step of supplying gas to said humidifier at a required pressure and resulting flow rate.

Claims 30-35 (Cancelled)

36. (Currently Amended) A breathing assistance apparatus adapted to deliver humidified gas at a desired level of humidity or at a desired temperature to a patient using open loop control comprising:

humidifier means having an electrical input power for humidifying said gas up to a level of humidity prior to delivery to said patient, said level of humidity depending on said electrical input power to said humidifier means,

conduit means for conveying said humidified gas from the humidifier means to the patient,

conduit heating means having an electrical input power, and being associated with said conduit means, wherein the gas flowing through said conduit means is heated either directly or indirectly by said conduit heating means, whereby the level of heating depends on said electrical input power to said conduit heating means, and

means for monitoring the electrical input power to said conduit heating means and determining a parameter which in combination with said power to said conduit heating means ~~indicative of the resistance or temperature of said conduit heating means or to the flow rate of said gas through said apparatus based on said input power to said conduit heating means;~~

means for determining based on at least said parameter the required electrical power input to said humidifier means to deliver said gas to said patient at a level of humidity or at a temperature substantially similar to said desired level of humidity or said desired temperature;

means for supplying as said input power to said humidifier means a level of power substantially similar to said determined power input to said humidifier means;

means for continuously monitoring said parameter, and when a change in said parameter is greater than a first threshold, indicating a change in the flow rate of said gas, the flow rate is determined again.